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Tailoring the structure and the properties of pyrolysed carbon electrodes

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Introduction

- Carbon 3D micro and nano electrodes can be fabricated using a carbon MEMS technique in a very simple high-yield process. Although not all polymers can be used as carbon precursors, carbonizable polymers are are typically much less expensive than metals used in thin film metal electrode fabrication.
- Possibility to explore many polymers to tune the physical, microstructural, and electrical/electrochemical properties of carbon electrodes in different fields.

Aim

Here we present a study with pyrolysed carbon derived from the photoresist SU-8, polystyrene and polystyrene-blockpolydimethylsiloxane copolymers to evaluate them as electrode material.

Fabrication of pyrolysed carbon electrodes

SEM images of pyrolysed polystyrene (PS) and polystyrene-blockpolydimethylsiloxane (PS-PDMS).

Thermal Gravimetric Analysis

X-Ray Photoelectron Spectroscopy

Raman Spectroscopy

Determination of the standard rate constant for electron transfer

Standard rate constant for electron transfer (k^0) values calculated from the experimental ΔE_p of the CVs obtained at scan rate of 10 mV s^{-1}.